

**REGISTRY OF PATENTS
SINGAPORE**

This is to certify that the annexed is a true copy of the following international application as filed with the Registry as the receiving Office and of any corrections thereto.

Date of Filing : 25 MAR 2003

REC'D 25 MAR 2004

Application Number : PCT/SG03/00084 [withdrawn]

WIPO PCT

Applicant(s) /
Proprietor(s) of Patent : PHILIPS ELECTRONICS SINGAPORE PTE
LTD;
KONINKLIJKE PHILIPS ELECTRONICS N.V.

Title of Invention : STEAM IRONING DEVICE

BEST AVAILABLE COPY

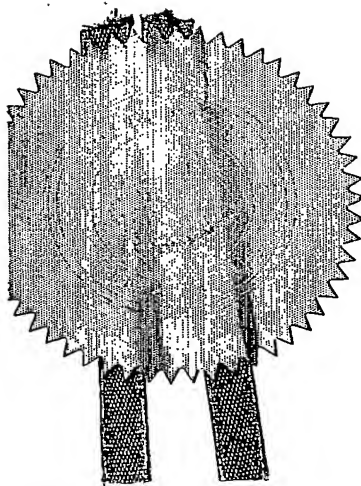
**PRIORITY
DOCUMENT**

SUBMITTED OR TRANSMITTED IN
COMPLIANCE WITH RULE 17.1(a) OR (b)



Sandra Lynn Merinda (Ms)
Assistant Registrar
for REGISTRAR OF PATENTS
SINGAPORE

04 Feb 2004



HOME COPY

1/3

PNL030335WOP

PCT REQUEST

Original (for SUBMISSION) - printed on 21.03.2003 01:55:01 PM

| | | |
|---------|---|--|
| 0 | For receiving Office use only | |
| 0-1 | International Application No. | PCT/SG 0 3 / 0 0 0 8 4 |
| 0-2 | International Filing Date | 12 5 MAR 2003 (25-03-03) |
| 0-3 | Name of receiving Office and "PCT International Application" | REGISTRY OF PATENTS (SINGAPORE) PCT INTERNATIONAL APPLICATION |
| 0-4 | Form - PCT/RO/101 PCT Request | |
| 0-4-1 | Prepared using | PCT-EASY Version 2.92 (updated 01.01.2003) |
| 0-5 | Petition The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty | |
| 0-6 | Receiving Office (specified by the applicant) | Intellectual Property Office of Singapore (RO/SG) |
| 0-7 | Applicant's or agent's file reference | PNL030335WOP |
| I | Title of invention | STEAM IRONING DEVICE |
| II | Applicant | |
| II-1 | This person is: | applicant only |
| II-2 | Applicant for | SG |
| II-4 | Name | PHILIPS ELECTRONICS SINGAPORE PTE LTD |
| II-5 | Address: | Attn. Mr J.C. De Visser 620A Lorong 1 Toa Payoh TP2-2nd Floor 319762 Singapore Singapore |
| II-6 | State of nationality | SG |
| II-7 | State of residence | SG |
| II-8 | Telephone No. | +65 7995021 |
| II-9 | Facsimile No. | +65 7995022 |
| III-1 | Applicant and/or inventor | |
| III-1-1 | This person is: | applicant only |
| III-1-2 | Applicant for | all designated States |
| III-1-4 | Name | KONINKLIJKE PHILIPS ELECTRONICS N.V. |
| III-1-5 | Address: | Groenewoudseweg 1 NL-5621 BA Eindhoven Netherlands |
| III-1-6 | State of nationality | NL |
| III-1-7 | State of residence | NL |
| III-1-8 | Telephone No. | +31 40 2743444 |
| III-1-9 | Facsimile No. | +31 40 2743489 |

CONFIRMATION COPY

PCT REQUEST

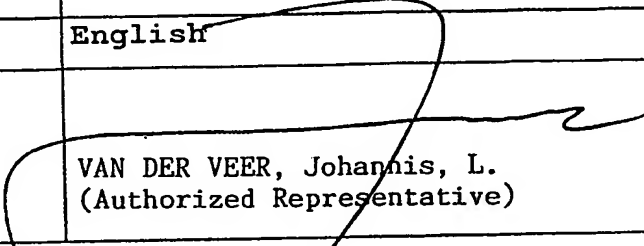
PNL030335WOP

Original (for SUBMISSION) - printed on 21.03.2003 01:55:01 PM

| | | | |
|--------|--|--|-----------------------------|
| V | Designation of States | | |
| V-1 | Regional Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned) | EP: AT BE CH&LI CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE and any other State which is a Contracting State of the European Patent Convention and of the PCT (except BG CZ EE HU SI SK TR) | |
| V-2 | National Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned) | SG | |
| V-5 | Precautionary Designation Statement In addition to the designations made under items V-1, V-2 and V-3, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except any designation(s) of the State(s) indicated under item V-6 below. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. | | |
| V-6 | Exclusion(s) from precautionary designations | NONE | |
| VI | Priority claim | NONE | |
| VII-1 | International Searching Authority Chosen | European Patent Office (EPO) (ISA/EP) | |
| VIII | Declarations | Number of declarations | |
| VIII-1 | Declaration as to the identity of the inventor | - | |
| VIII-2 | Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent | - | |
| VIII-3 | Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application | - | |
| VIII-4 | Declaration of inventorship (only for the purposes of the designation of the United States of America) | - | |
| VIII-5 | Declaration as to non-prejudicial disclosures or exceptions to lack of novelty | - | |
| IX | Check list | number of sheets | electronic file(s) attached |
| IX-1 | Request (including declaration sheets) | 3 | - |
| IX-2 | Description | 10 | - |
| IX-3 | Claims | 4 | - |
| IX-4 | Abstract | 1 | EZABST00.TXT |
| IX-5 | Drawings | 6 | - |
| IX-7 | TOTAL | 24 | |

PCT REQUEST

Original (for SUBMISSION) - printed on 21.03.2003 01:55:01 PM

| | Accompanying items | paper document(s) attached | electronic file(s) attached |
|-------|--|---|-----------------------------|
| IX-8 | Fee calculation sheet | ✓ | - |
| IX-11 | Copy of general power of attorney | ✓ | - |
| IX-17 | PCT-EASY diskette | - | Diskette |
| IX-19 | Figure of the drawings which should accompany the abstract | 1 | |
| IX-20 | Language of filing of the international application | English | |
| X | Signature of applicant, agent or common representative |  VAN DER VEER, Johannis, L. (Authorized Representative) | |
| X-1 | Name (LAST, First) | | |
| X-2 | Capacity | | |

FOR RECEIVING OFFICE USE ONLY

| | | |
|--------|---|------------------------|
| 10-1 | Date of actual receipt of the purported international application | 25 MAR 2003 (25-03-03) |
| 10-2 | Drawings: | |
| 10-2-1 | Received | |
| 10-2-2 | Not received | |
| 10-3 | Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application | |
| 10-4 | Date of timely receipt of the required corrections under PCT Article 11(2) | |
| 10-5 | International Searching Authority | ISA/EP |
| 10-6 | Transmittal of search copy delayed until search fee is paid | |

FOR INTERNATIONAL BUREAU USE ONLY

| | | |
|------|--|--|
| 11-1 | Date of receipt of the record copy by the International Bureau | |
|------|--|--|

Steam ironing device

The invention relates to a steam ironing device comprising a steam iron having a housing, a soleplate at the bottom side of said housing and at least one discharge opening in said soleplate, said device comprises means for generating mist steam and for delivering said generated mist steam from said at least one discharge opening, and control means to control
5 the delivery of said mist steam.

To improve the ironing result it is generally known to moisten fabric before it is ironed. Moistening can, for example, be done by spraying water on the fabric. The fabric
10 will absorb the water and after a while the fabric is moistened. Spraying water can be done by means of a separate container or by means of a spraying device provided on an iron. The way the fabric is moistened uniformly depends on the user's skill. In general, a homogeneous moistening of the fabric will not occur.

Another manner to moisten fabric is by means of steam. Steam irons are well
15 known. During ironing steam penetrates in the fabric making the removal of wrinkles easier during the subsequent ironing strokes. This manner of moistening is more convenient for the user, however the moistening itself is not very satisfactorily. Water evaporates too quickly, because the temperature of the fabric is high, often about 100°C. Often a part of the steam goes through the fabric, moistening the cover layer of the ironing board, which is, of course,
20 not desired.

Still another manner to moisten fabric is by means of a spray of mist, either through a nozzle in the front part of an iron or through a delivery opening in the soleplate. The spray of mist can be obtained by atomization of cold water from the water reservoir. One example is where water is introduced into an airflow and a 2-fluid mixture thus formed is
25 ejected in a spray of mist through a nozzle. Compared to a spray of water, cold mist causes a more homogeneous moistening of the fabric. Nevertheless, during the ironing strokes the absorbed cold mist has to be heated up and evaporated. Mist can also be obtained by introducing water into a flow of steam, the 2-fluid mixture thus formed is ejected in a spray of mist through a nozzle. This kind of mist is called mist steam. An iron, which is able to

produce mist steam, is known from US-A-2762143 and described in the openings paragraph hereabove. In this connection, mist steam is to be understood as steam in which fine water droplets are incorporated whereby at least 50% of the particles have a particle size of 10-60 μm . This is much more than in a spray of water which is obtained by a spraying device of a usual spray iron where only 10-20% of the particles have a particle size of 10-60 μm .

5 In the ironing process, when ironing strokes are made, moisture in the garment is removed from the garment due to the heat applied. To obtain a desired ironing effect of a certain piece of garment, in particular garment of cellulosic material, about six to eight strokes of ironing would have been applied on each and every location. It is necessary that at 10 the end of the ironing effort the garment is get rid of the applied moisture, to prevent a recovery of wrinkle or to resist the creation of new wrinkles due to handling and storage.

It is an object of the invention to improve an ironing device as described in the 15 openings paragraph in order to achieve a desired ironing result with less ironing strokes and thus in less time compared to known irons up to now.

According to the invention, this object is achieved in that the ironing device is provided with means for generating superheated steam and with a plurality of second discharge openings in the soleplate for the delivery of said superheated steam.

20 The inventors have found that a substantial improvement in ironing result, in particular for garment of cellulosic material, can be realized by using an iron which has the capability to deliver mist steam as well as superheated steam. Superheated steam is steam heated beyond its saturation point. During the first stroke or first and second strokes of ironing of each location, the garment is sufficient moistened by the applied mist steam to 25 bring about a more complete wrinkle relaxation. Sufficient moisture in the context of this invention means that there is a net measurable increase in the moisture content of the garment being ironed after the first stroke or the first and second strokes, at a level of 1 % to 5 %, the percentage being the moisture gained against the dry fabric weight of the garment. This requires that the amount of water introduced to the steam is between 10 to 40 g/min, more 30 preferably from 15 to 30 g/min. The amount of steam required to atomize this amount of water is at least equal to the amount of water to be atomized. For example to deliver 15 g/min of mist, at least 15 g/min of steam is required. In the subsequent ironing strokes only superheated steam is applied to the location being ironed. The superheated steam helps to distribute the prior applied moisture in the garment more uniformly as well as helps to

achieve a thorough heating up of the garment. The moistened garment, heated up by superheated steam, is caused to be smoothened, flattened and dried by the hot soleplate. It has been observed that often only three to four ironing strokes are sufficient to achieve a very good ironing result. For example, one or two strokes for applying mist steam, followed by two strokes with superheated steam. This is substantially less than can be achieved with known irons on the market up to now.

It will be clear that the control means enables the user to decide when and, if desired, how much mist is applied.

In a preferably embodiment of the ironing device, said at least one discharge opening for mist steam is provided in a tip area of the soleplate. The tip area of the soleplate is pointed so as to iron difficult areas of clothes such as corners, pockets, in between buttons, etc. more easily. By providing the mist discharge opening in the tip area of the soleplate these areas can be moistened better.

A further preferred embodiment of the ironing device is characterized in that the device comprises

- a steam generator,
- heating means for heating said steam generator,
- water supply means,
- a water passage between the water supply means and the steam generator,
- an electric pump for the delivery of water through said water passage from the water supply means to the steam generator,

said iron comprises

- a first steam passage between the steam generator and said plurality of steam discharge openings for the delivery of superheated steam,
- a second steam passage between the steam generator and the at least one mist discharge opening and
- a second water passage between the pump and the second steam passage.

Only one steam generator and one pump are necessary to generate superheated steam and mist steam. Said superheated steam is delivered through the second discharge openings. Mist steam is obtained by introducing water into the superheated steam and to deliver the resultant 2-fluid mixture through the mist steam discharge opening.

It also possible to provide the iron with a heated chamber or a heated channel or a combination thereof located downstream of the steam generator to be sure that the steam delivered through the discharge openings is superheated.

Another embodiment of the above described ironing device comprises a water supply station, separate from said iron, said water supply station comprises a water reservoir and said electric pump. In this embodiment the water reservoir can be made much larger which is convenient during a long ironing period. Also the control means may be located in such a station. The water supply station is connected to the iron by means of a flexible tube.

A further embodiment of the ironing device is characterized in that the steam passage between the steam generator and the steam discharge openings for superheated steam comprises a pressure dependent valve. This valve limits the steam flow to the steam discharge opening, causing steam flow to be directed to the mist discharge opening. Due to the small size of mist delivery opening, pressure is built-up rapidly for proper mist generation. When the pressure reaches a predetermined value, the excess steam escapes via the pressure dependent valve. In this way the delivering of big water droplets to the garment is avoided.

Another embodiment of the ironing device is characterized in that the device comprises

- a steam generator for the generation of mist steam,
- water supply means,
- a water passage between the water supply means and the steam generator,
- an electric pump for the delivery of water through said water passage from the water supply means to the steam generator,

said iron comprises

- a heated chamber for generating said superheated steam, said heated chamber being located downstream of the steam generator and being in communication with said plurality of steam discharge openings,
- a first steam passage between the steam generator and said heated chamber,
- a second steam passage between the steam generator and said at least one mist discharge opening,

said device further comprises heating means for heating said steam generator and said heated chamber.

In this embodiment mist steam is generated in the steam generator. The generated mist steam can be used to deliver the mist steam directly through the mist discharge opening(s), without the necessity to mix it with water. The generated mist steam can also be heated up to superheated steam in the heated chamber to be delivered through the plurality of discharge openings for superheated steam.

Another embodiment of the above described ironing device comprises a steam generating station, separate from said iron, said steam generating station comprises a water reservoir, said steam generator for generating mist steam and said electric pump. In this embodiment more components of the device are located in a separate housing so that the iron
5 can be made lightweight. Moreover the water reservoir and the steam chamber for generating mist steam can be made larger.

Another embodiment of the above described ironing device comprises a steam generation station, separate from said iron, said steam generating station comprises a boiler for generating hot water and steam,

10 said steam generating station comprises

- a first steam passage connecting a steam space of the boiler with the iron,
- a water passage between said boiler and said first steam passage for inserting hot water into said first steam passage,

said iron comprises

- 15
- a heated chamber in communication with the first steam passage for generating superheated steam, said heated chamber being located downstream of the boiler and being in communication with said plurality of second discharge openings,
 - a second steam passage connecting the first steam passage with said at least one mist discharge opening,

20 said device further comprising heating means for heating said heated chamber and said boiler.

In this embodiment there is no cold water reservoir, but a boiler which in operation contains an amount of hot boiling water and saturated steam in the steam space above the water level.

In the heated chamber saturated steam is heated further to superheated steam. Hot water is
25 inserted into the saturated steam which flows through the first steam passage and in this way a 2-fluid mixture is obtained. In the iron, the 2-fluid mixture then flows into the second steam passage toward the mist discharge opening. In contrast to the other embodiment, hot water instead of cold water is now inserted into the steam, so that cooling down of the steam is limited.

30 A further embodiment of the described ironing device is characterized in that the iron comprises a flow divider and that the soleplate comprises a plurality of mist discharge openings, each opening being connected to the flow divider by means of a mist steam passage. More mist discharge openings improves the uniform moistening of the garment.

Still another embodiment of the ironing device is characterized in that the iron is provided with a cartridge for additive liquid and means to add said additive liquid to the mist steam. Adding an additive liquid to the mist steam may have several advantages such as an improved wrinkling resistance and an easier gliding of the iron over the garment. If the additive liquid is in a concentrated form, the liquid can be diluted with water from the water reservoir.

The ironing device according to the invention may also be provided with a spray nozzle in the front part of the housing of the iron so as to spray water or mist steam and, if desired, combined with additive liquid directly on the garment to be ironed.

To enable the user to operate the ironing device in the several modes, the water and steam passages in the iron are provided with one or more valves which are operable by means of one or more buttons on the housing of the iron.

To bring about the sequential delivery of steam mist and superheated steam, control means are provided. One example of such control mean is a mechanical or electromechanical valve that selectively direct the steam from the steam generator to the steam mist generation nozzles or the heated chamber. Said mechanical or electromechanical valve being actuated by a switch. Yet another mechanical or electromechanical valve is provided to selectively direct water into the steam passage, terminating at the steam mist generation nozzle.

These and other aspects of the invention will be apparent from and elucidated with reference to the embodiments described hereinafter.

In the drawings:

Fig.1 is a diagrammatic cross-sectional view of a steam iron of a steam ironing device according to a first embodiment,

Fig.2 is a diagrammatic cross-sectional view of a steam ironing device with a water supply station according to a second embodiment,

Fig.3 is a diagrammatic cross-sectional view of a steam iron of a steam ironing device including a cartridge for additive liquid according to a third embodiment,

Fig.4 is a bottom view of the soleplate of the steam iron of a steam ironing device showing the discharge openings for mist steam and superheated steam,

Fig.5 is a diagrammatic cross-sectional view of a steam iron of a steam ironing device according to a fourth embodiment,

Fig.6 is a diagrammatic cross-sectional view of a steam ironing device with a steam generation station according to a fifth embodiment,

Fig.7 is a diagrammatic cross-sectional view of a steam iron of a steam ironing device according to a sixth embodiment, and

5 Fig.8 is a diagrammatic cross-sectional view of a steam ironing device with a steam generation station comprising a boiler according to a seventh embodiment.

Throughout all embodiments similar parts of the ironing device are indicated
10 with the same reference numerals.

The steam ironing device of the first embodiment (Fig.1) consist of a steam iron 1 having a housing 2 with a soleplate 3 at the bottom side of the housing. A water reservoir 12, an electric pump 14, a steam generator 10 and control means 6 are accommodated inside the housing. User-operable control buttons 40 are provided on the
15 housing 2 to control several function of the device. The soleplate 3 of the iron is provided with two different types of steam discharge openings. Discharge opening 4, located in the tip area of the soleplate, is for the delivery of mist steam, and second discharge openings 8 are for the delivery of superheated steam 7. A water passage 13 connects the water reservoir 12 with the electric pump 14 and the electric pump with the steam generator 10. A first steam
20 passage 16 connects the steam generator 10 with the second discharge openings 8. A second steam passage 17 connects the steam generator 10 with the discharge opening 4. In the embodiment the second steam passage 17 branches off the first steam passage 16. A second water passage 18 connects the electric pump 14 with the second steam passage 17. In the
embodiment the second water passage 18 branches off the water passage 13. The iron is
25 further provided with a heating element 11 for heating the soleplate 3 and for heating the steam generator 10.

In operation when the iron is powered, the user can decide to perform the ironing task with the aid of steam. By means of one of the control buttons 40 the user can start the electric pump 14 to pump water 15 from the water reservoir 12 to the steam
30 generator 10. The flow rate of the water is determined by adjusting one of the buttons 40. In the steam generator water is heated so as to obtain superheated steam 7. The superheated steam is forced via distribution channels 23 located in the soleplate 3 to the second discharge openings 8. As the distribution channels are located in the hot soleplate any condensation of the superheated steam is prevented. By means of one of the buttons 40 the user can open

adjustable valves 31, 32 in the second steam passage 17 respectively the second water passage 18. Water is then introduced into the second steam passage 17 which results in the formation of mist steam 5. The mist steam 5 is delivered through the discharge opening 4. The mist steam rate and the amount of water introduced into the steam can be adjusted by the user.

The steam ironing device of the second embodiment (Fig.2) comprises a steam iron 1 and a water supply station 50. The steam iron 1 differs from the steam iron of the first embodiment in that the water reservoir 12 and the electric pump 14 are now accommodated in the station 50. Compared to the ironing device of Fig.1 the water reservoir can have now a much bigger volume. Preferably the control unit 6 is also accommodated in the station 50. The operation of the ironing device is similar to that of the first embodiment in Fig.1.

The steam ironing device of the third embodiment (Fig.3) is an extension of the device of the first embodiment. The iron 1 comprises several additional features. Firstly, the steam generator produces now normal steam in stead of superheated steam. This means that this normal steam should be heated up to superheated steam 7 before it is delivered from the second discharge openings 8. Therefore, the iron is provided with a heated chamber 20. Preferably this heated chamber 20 is located in the soleplate 3 and heated by the same heating element 11 for heating the soleplate. Additionally, the iron can be provided with a pressure dependent valve 19 located in the first steam passage 16. This ensure that excess steam could escape via the pressure dependent valve 19. Secondly, there are a number of discharge openings 4 for the delivery of mist steam 5. To this end the iron is provided with a flow divider 24 located downstream of the mist steam passage 25. The discharge openings 4 are each connected with the flow divider 24 through mist steam passages 25a. These discharge openings are located in the tip area 9 of the soleplate 3 as shown in Fig.4. A third feature is the provision of a cartridge 26 containing an additive liquid 27. Additive liquids can be used e.g. for improving the wrinkle resistance of the clothes to be ironed or a better gliding of the soleplate over the garment. The additive liquid can be added to the mist steam so as to be delivered through the discharge openings 4. For the delivery of mist steam the second water passage 18 is now separate from the first water passage 13. The iron is provided with a second pump 38 for pumping water 15 through the second water passage 18 to the second steam passage 17. An additive liquid passage 28 connects the cartridge with the second water passage 18. By means of a (adjustable) valve 33 in the additive liquid passage 28 the user can control the addition of additive liquid to the mist steam. The last feature is the provision of a spray nozzle 29 in the lower front part 30 of the housing 2. The spray nozzle 29 is connected

to the mist steam passage 25 through a passage 39. The passage 39 can be opened or closed by means of a valve 34, which is operable, by the user via a button on the housing of the iron.

In the fourth embodiment (Fig.5) the iron 1 of the steam ironing device comprises a steam generator 10 for generating mist steam 5. For the generation of superheated steam 7, the steam generator 10 is connected to a heated chamber 20 by means of a second steam passage 21. The heated chamber 20 is connected with the second discharge openings 8 by means of distribution channels (not shown). The mist steam generator 10 is also connected to the mist steam discharge opening 4 by a second steam passage 25. This second steam passage 25 branches off the first steam passage 21. By opening a valve 35 in the first steam passage 21 the mist steam 5 is forced through the second steam passage 25 toward the mist discharge opening 4. The advantage of this embodiment is that mist steam is generated in the steam generator 10, so that it is not necessary to introduce water into a steam passage to obtain mist steam.

The steam ironing device of the fifth embodiment (Fig.6) comprises a steam iron 1 and a steam generating station 60. The steam iron 1 differs from the steam iron of the fourth embodiment in that the steam generator 10, the water reservoir 12 and the electric pump 14 are now accommodated in the station 60. Also the control unit 6 can be accommodated in the station 60. The operation of the ironing device is further similar to that of the fourth embodiment.

The steam ironing device of the sixth embodiment (Fig.7) is an extension of the fourth embodiment. Similar as in the third embodiment the iron 1 is provided with additional features such as the flow divider 24 and spray nozzle 29. By means of three-way valve 35 mist steam can be directed either to the discharge openings 4 or to the nozzle 29.

The steam ironing device of the seventh embodiment (Fig.8) differs from the fifth embodiment in that steam generating station 60 comprises now a boiler 10 for the generation of steam. A pump and a cold water reservoir are not necessary. The boiler is heated by means of a heating element 44 at the bottom of the boiler. In operation, water in the boiler is heated to the boiling temperature. The boiler is then pressurized. The space 45 above the water level contains saturated steam. By opening a valve 37 in a first steam passage 21 steam flows through the first steam passage 21 to the heated chamber 20 of the iron 1. In the heated chamber 20 the steam is further heated to superheated steam 7 which is discharged through the openings 8. The valve 37 can be opened by means of a trigger 40a on the iron. For generating mist steam, a water passage 41 is connected between the boiler 10 and the first steam passage 21. By opening the valve 36, hot water is inserted into the steam in the

first steam passage 21. The hot water mixes with the saturated steam and in this way a 2-fluid mixture is obtained. The 2-fluid mixture flows through the first steam passage 21 to the iron and via the second steam passage 25 to the mist discharge opening(s) 4. By means of one of the buttons 40 the valve 36 can be opened or closed. The amount of hot water inserted into the first steam passage 21 can be regulated by means of an adjustable restriction 42 in the water passage 41. If mist steam is generated, the mist steam flows also into the heated chamber 20. This no problem because the mist steam can easily be heated up in this heated chamber to superheated steam. If only superheated steam is required, the valves 35 and 36 are closed. When the boiler is depressurized, the boiler can be filled with water through the filling cap 43.

Also in this embodiment the iron can be provided with a flow divider 24 to deliver mist steam 5 through a number of openings 4 in the soleplate, or with a spray nozzle 29 for spraying mist steam on the garment, as shown in Fig.7.

CLAIMS:

1. A steam ironing device comprising a steam iron (1) having a housing (2), a soleplate (3) at the bottom side of said housing and at least one discharge opening (4) in said soleplate (3), said device comprises means for generating mist steam (5) and for delivering said generated mist steam (5) from said at least one discharge opening (4), and control means (6) to control the delivery of said mist steam (5),
5 characterized in that

the iron (1) is provided with means for generating superheated steam (7) and with a plurality of second discharge openings (8) in the soleplate (3) for the delivery of said superheated steam (7).
10

2. A steam ironing device as claimed in claim 1, characterized in that said at least one mist steam discharge opening (4) for mist steam (5) is provided in a tip area (9) of the soleplate (3).

15 3. A steam ironing device as claimed in claim 1 or 2, characterized in that the device comprises

- a steam generator (10),
- heating means (11) for heating said steam generator (10),
- water supply means (12),
- 20 - a water passage (13) between the water supply means (12) and the steam generator (10),
- an electric pump (14) for the delivery of water (15) through said water passage (13) from the water supply means (12) to the steam generator (10),

said iron (1) comprises

- a first steam passage (16) between the steam generator (10) and said plurality of second discharge openings (8) for the delivery of superheated steam (7),
25
- a second steam passage (17) between the steam generator (10) and the at least one mist discharge opening (4) and
- a second water passage (18) between the pump (14) and the second steam passage (17).

4. A steam ironing device as claimed in claim 3, characterized in that the iron comprises a heated chamber (20) or heated channel or a combination thereof located downstream of the first steam passage (16) for generating superheated steam (7).

5 5. A steam ironing device as claimed in claim 3 or 4, characterized in that the device comprises a water supply station (50), separate from said iron (1), said water supply station (50) comprises a water reservoir (12) and said electric pump (14).

10 6. A steam iron as claimed in 3, 4 or 5, characterized in that the first steam passage (16) between the steam generator (10) and the second steam discharge openings (8) for superheated steam (7) comprises a pressure dependent valve (19).

7. A steam iron as claimed in claim 1 or 2, characterized in that the device comprises

- 15 - a steam generator (10) for generating mist steam (5),
- water supply means (12),
- a water passage (13) between the water supply means (12) and the steam generator (10),
- an electric pump (14) for the delivery of water (15) through said water passage (13) from
the water supply means (12) to the steam generator (10),

20 said iron comprises

- a heated chamber (20) for generating superheated steam (7), said heated chamber (20) being located downstream of the steam generator (10) and being in communication with said plurality of second discharge openings (8),
- a first steam passage (21) between the steam generator (10) and the heated chamber (20),
25 - a second steam passage (25) between the steam generator (10) and said at least one mist discharge opening (4),

said device further comprising heating means for heating said steam generator (10) and said heated chamber (20).

30 8. A steam ironing device as claimed in claim 7, characterized in that the device comprises a steam generating station (60), separate from said iron (1), said steam generating station (60) comprises a water reservoir (12), said steam generator (10) for generating mist steam (5) and said electric pump (14).

9. A steam iron as claimed in claim 1 or 2, characterized in that the device comprises a steam generation station (60), separate from said iron (1), said steam generating station (60) comprises a boiler (10) for generating hot water (15) and steam,

5 said steam generating station (60) comprises

- a first steam passage (21) connecting a steam space (45) of the boiler with the iron (1),
- a water passage (41) between said boiler (10) and said first steam passage (21) for inserting hot water (15) into said first steam passage (21),

said iron comprises

- 10 - a heated chamber (20) in communication with said first steam passage (21) for generating superheated steam (7), said heated chamber (20) being located downstream of the boiler (10) and being in communication with said plurality of second discharge openings (8),
- a first steam passage (21) between the boiler (10) and the heated chamber (20),
 - a second steam passage (25) between the boiler (10) and said at least one mist discharge
- 15 opening (4),

said device further comprising heating means (11, 44) for heating said heated chamber (20) and said boiler (10).

10. A steam ironing device as claimed in any one of the claims 3 to 9,
20 characterized in that the iron (1) comprises a flow divider (24) and that the soleplate (3) comprises a plurality of mist discharge openings (4), each opening (4) being connected to the flow divider (24) by means of a mist steam passage (25).

11. A steam ironing device as claimed in claim 3, 4 or 5, characterized in that the
25 iron (1) is provided with a cartridge (26) for additive liquid (27) and means to add said additive liquid (27) to the mist steam (5).

12. A steam ironing device as claimed in claim 11, characterized in that the iron
(1) comprises an additive liquid passage (28) for connecting the cartridge (26) with the
30 second water passage (18) to obtain a diluted additive liquid downstream of said second water passage (18).

13. A steam ironing device as claimed in any one of the claims 1 to 12,
characterized in that the iron (1) is provided with a spray nozzle (29) in the front part (30) of

the housing (2).

14. A steam ironing device as claimed in any one of the claims 1 to 12,
characterized in that the iron (1) comprises valve means (31-37) for adjusting the amount of
5 mist steam (5) and superheated steam (7) to the respective discharge openings (4, 8).

ABSTRACT:

The invention relates to a steam ironing device with means to generate mist steam (5) as well as superheated steam (7). The soleplate (3) of the iron (1) is provided with discharge openings 4 for mist steam, preferably located in the front part of the soleplate, and with second discharge openings (8) for superheated steam.

5

CONFIRMATION COPY

1/6

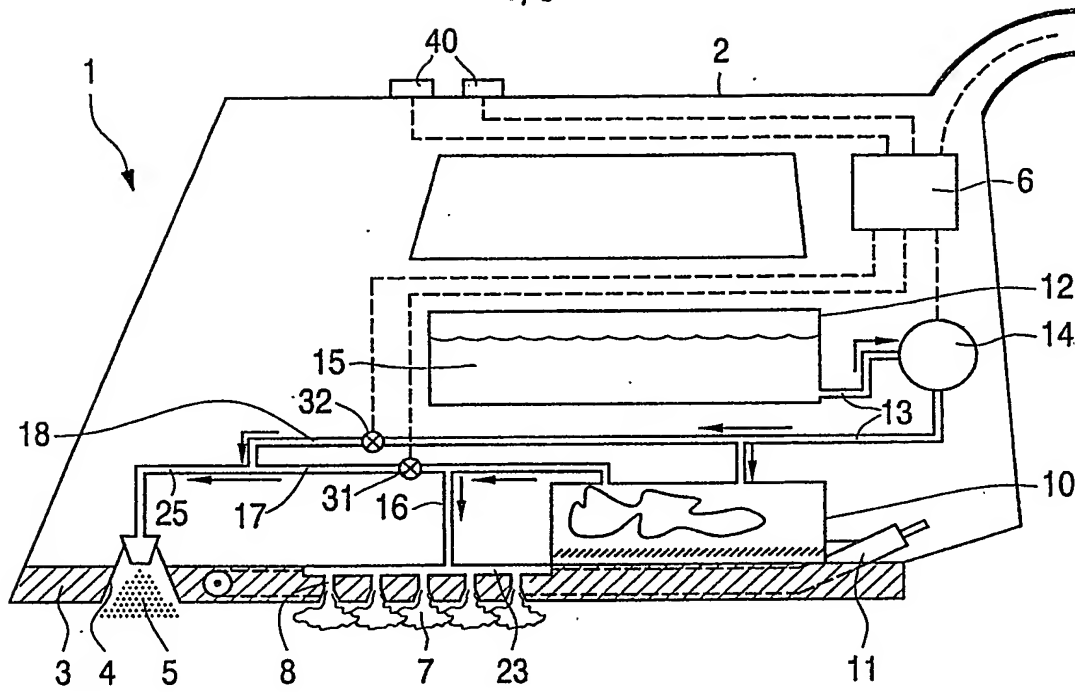


Fig. 1

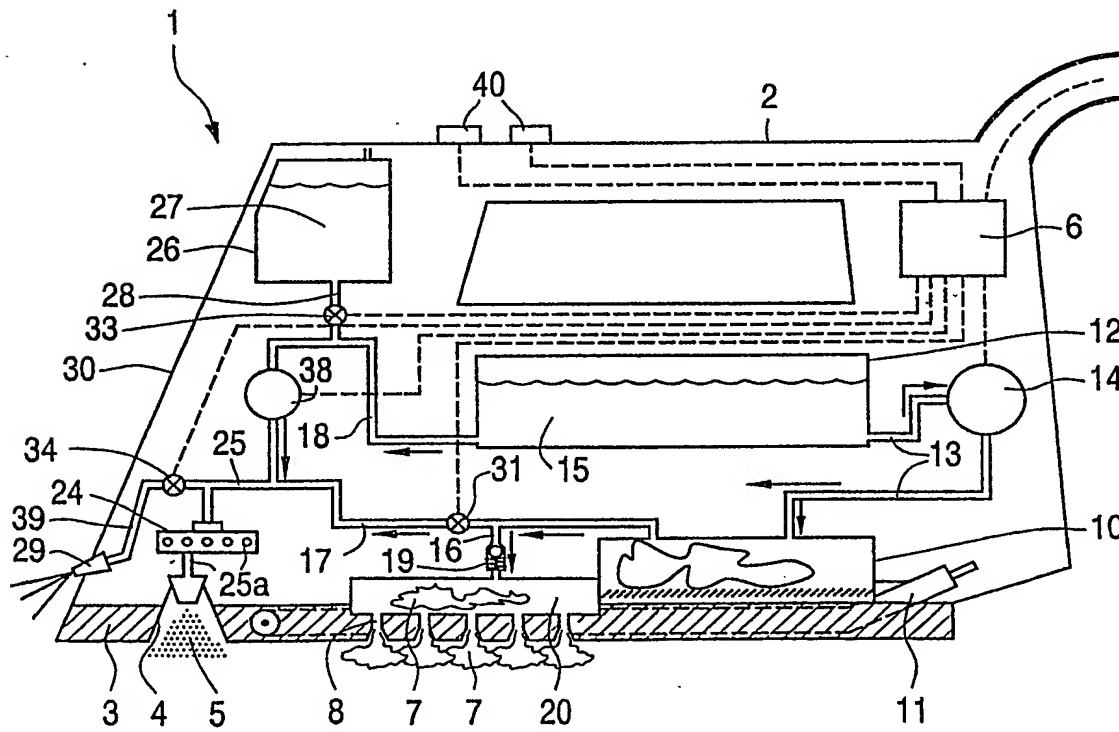


Fig.3

2/6

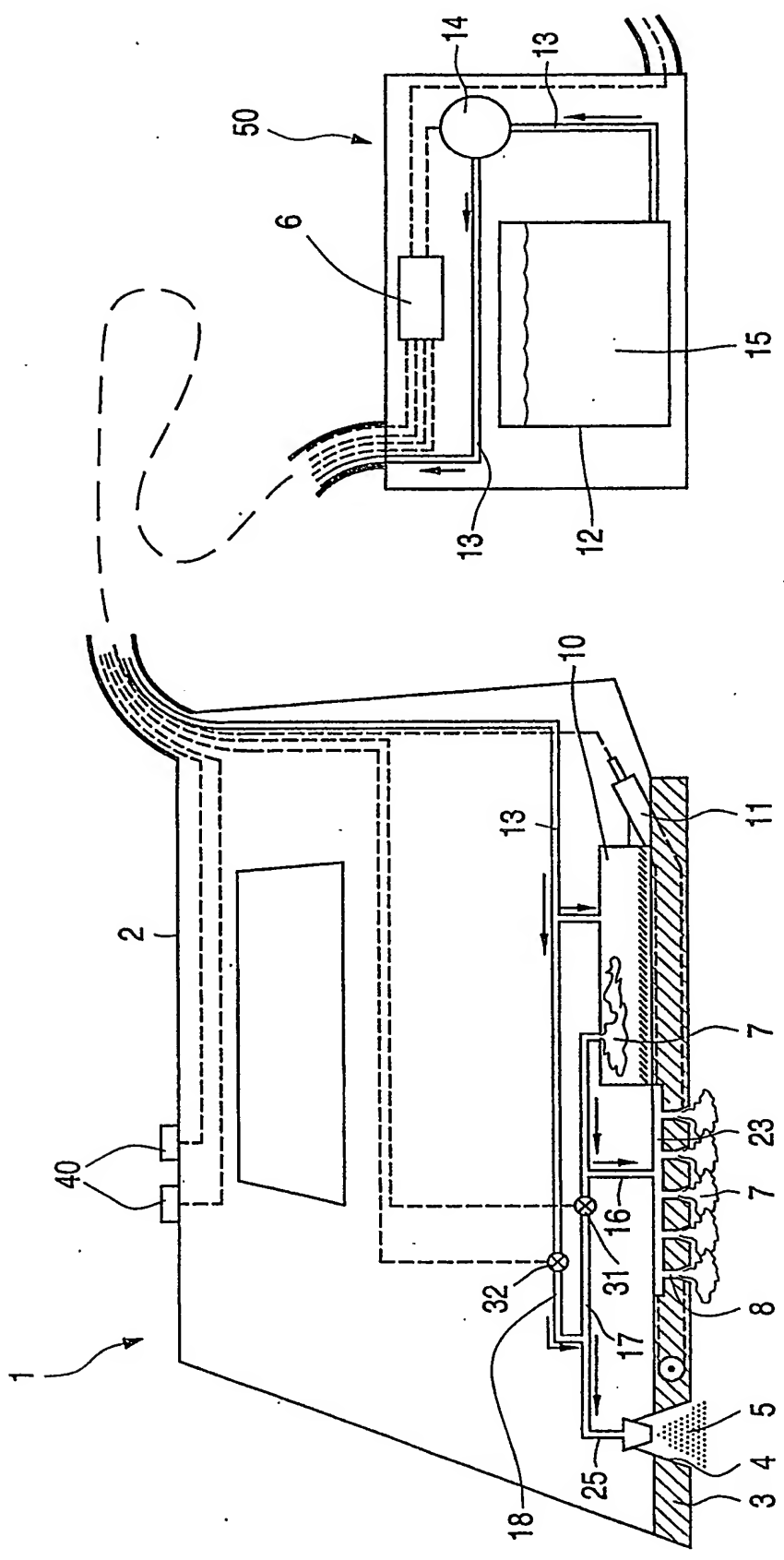


Fig.2

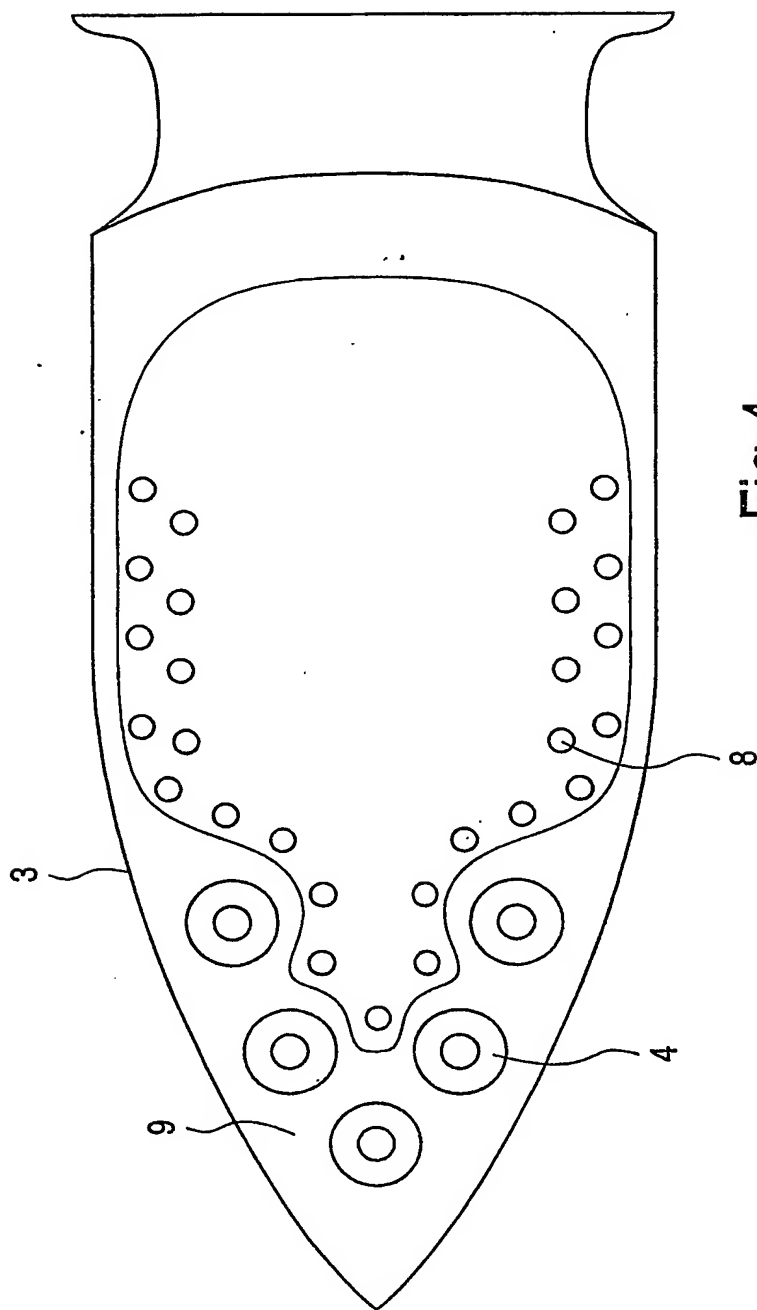


Fig. 4

4/6

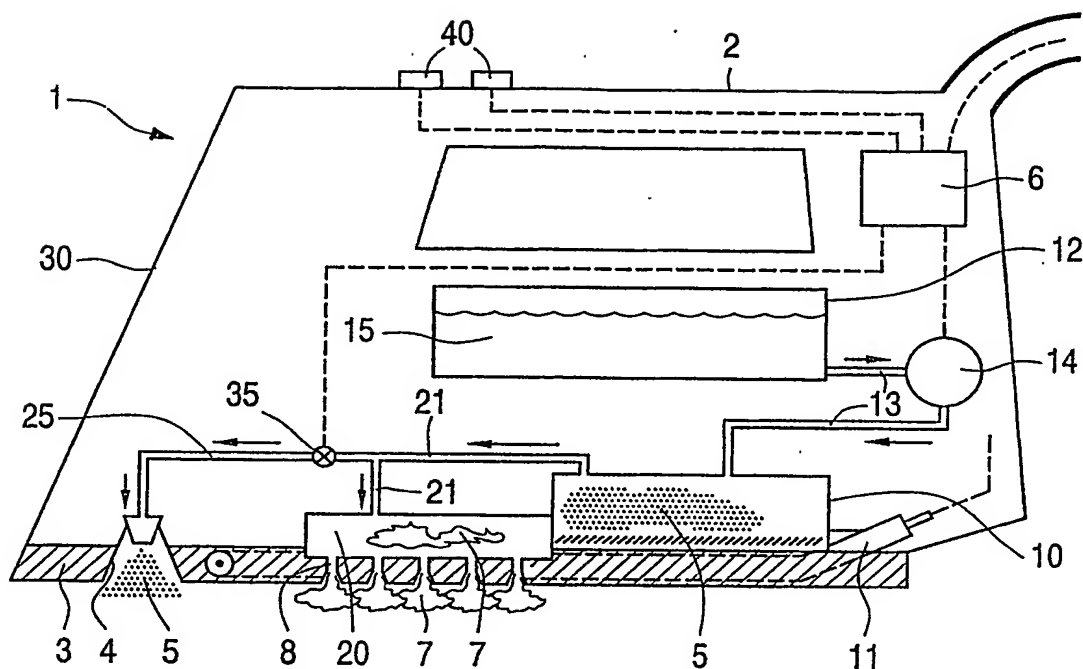


Fig.5

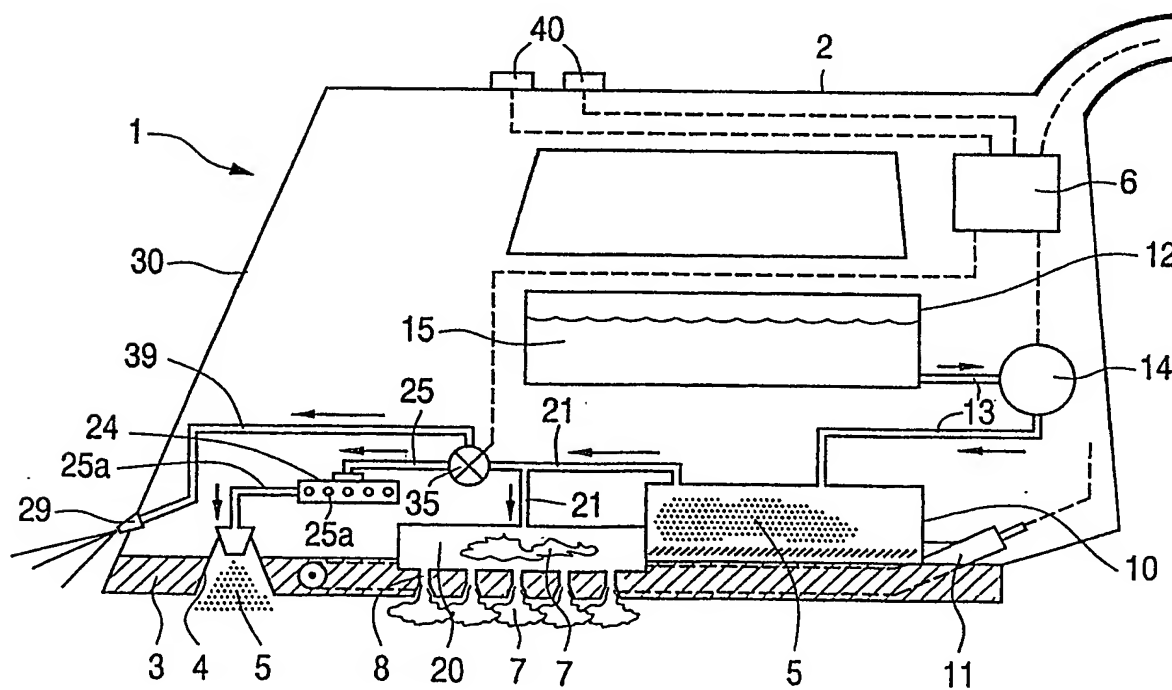


Fig.7

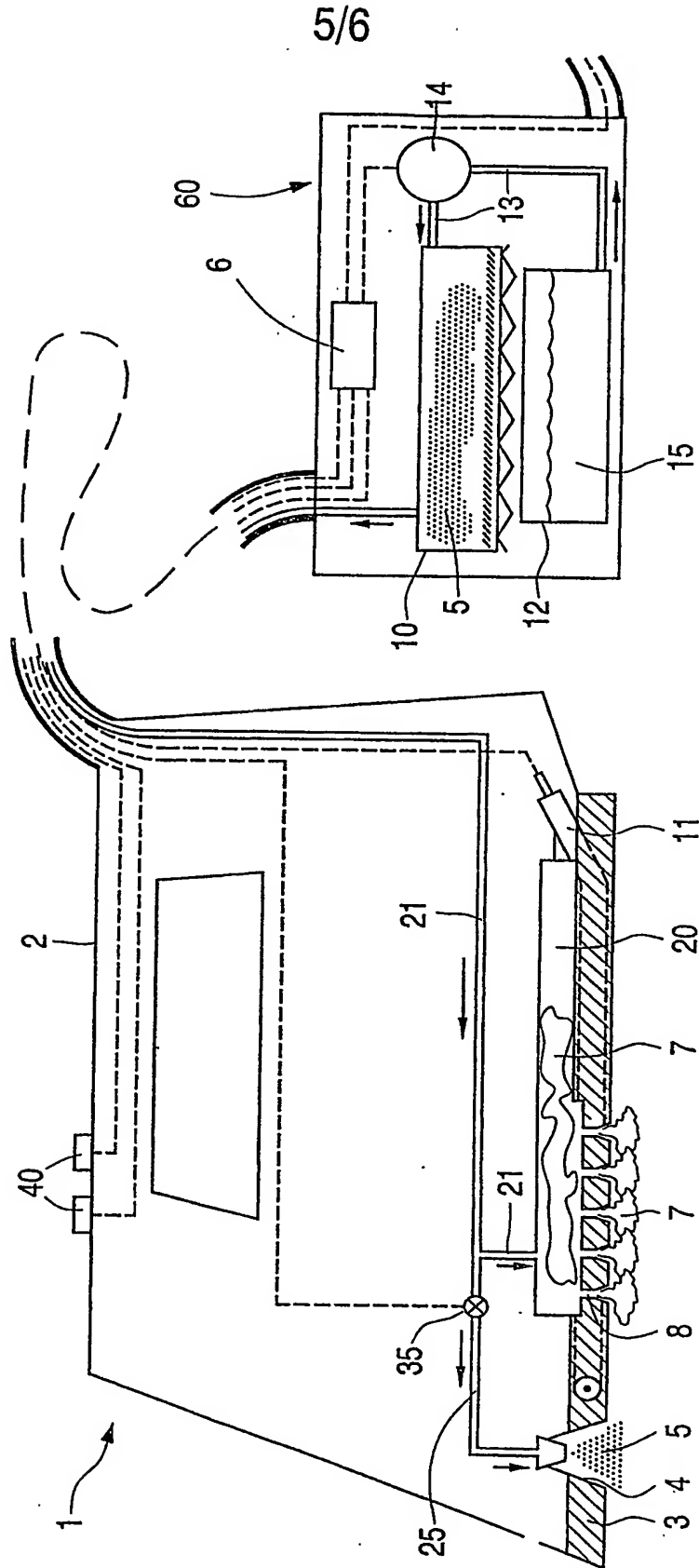


Fig. 6



**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☒ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☒ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.